

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Amendment of Parts 1, 2, 22, 24, 27, 90
and 95 of the Commission's Rules to
Improve Wireless Coverage Through the
Use of Signal Boosters

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) WT Docket No. 10-4
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To: The Commission

T-MOBILE USA, INC. REPLY COMMENTS

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To: The Commission

T-MOBILE USA, INC. REPLY COMMENTS

T-Mobile USA, Inc. (“T-Mobile”) replies to the comments filed addressing the Commission’s *Notice of Proposed Rulemaking* in the above-referenced proceeding.¹ T-Mobile supports the efforts by the Commission to facilitate the deployment of well-designed third-party signal boosters, as well as the collaborative approach taken by Verizon Wireless, V-COMM, and Wilson Electronics. T-Mobile believes, however, that some modifications to the framework proposed by these companies are necessary to ensure that licensees are adequately protected and to provide consumers with the ability to choose signal boosters best suited for their needs. T-Mobile recommends a stakeholder approach to refining the framework be implemented, wherein the interested parties work through a standards organization or other recognized body to ensure technical requirements protect carrier networks without overly restricting the design of signal boosters.

¹ *Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission’s Rules to Improve Wireless Coverage Through the Use of Signal Boosters*, Notice of Proposed Rulemaking, WT Docket No. 10-4, FCC 11-53 (rel. Apr. 6, 2011) (“NPRM”).

INTRODUCTION AND SUMMARY

T-Mobile supports the Commission's efforts to facilitate the deployment of well-designed third-party signal boosters that (i) protect incumbent, exclusive use licensees from interference and (ii) improve wireless coverage. T-Mobile also commends the work undertaken by Verizon Wireless, V-COMM, and Wilson Electronics to create a framework ("Joint Proposal") that was designed to facilitate booster deployment and protect incumbent licensees from interference.² The Commission has recognized that the best approach is "to create appropriate incentives for carriers and manufactures to collaboratively develop robust signal boosters that do not harm wireless networks."³ The Joint Proposal is a significant step in that direction. Although T-Mobile supports the collaborative approach taken in the Joint Proposal and agrees with some of its recommendations, some modifications are necessary to ensure that licensees are adequately protected and that consumers will be able to choose the signal booster that best suits their needs from a variety of well-designed models. A stakeholder approach would best ensure that appropriate modifications to the framework are added to protect carrier networks without overly restricting the design of signal boosters.

I. ANY RULES AUTHORIZING BOOSTER USE MUST PROTECT THE RIGHTS OF INCUMBENT LICENSEES

T-Mobile continues to believe that there are certain minimum steps that must be taken to ensure that incumbent licensees are protected from interference if the Commission's rules are modified to permit the widespread use of signal boosters. These steps were described in detail in T-Mobile's comments and are summarized below.

² See Written *Ex Parte* submission of Verizon Wireless and Wilson Electronics, Inc., WT Docket No. 10-4 (filed July 25, 2011) ("Joint Proposal").

³ *NPRM* at ¶ 1.

A. Signal Boosters Should Be Authorized in the Same Manner as Mobile Handsets

The Commission's approach to authorizing signal boosters should be consistent with how it authorizes mobile handsets.⁴ The Commission should not create a new CB Radio service, as proposed, to authorize the use of signal boosters. As demonstrated in T-Mobile's initial comments, that approach would undermine regulatory predictability, discourage investment, and harm the innovation that is characteristic of the wireless industry.⁵ The Commission has long held that subscribers' ability to operate handsets and other transmitters is derived from the authorization "held by the licensee providing service to them."⁶ The Commission thus should adopt rules that treat signal boosters like handsets and subject signal boosters to a similar authorization process.⁷

Consistent with the treatment of mobile handsets, the FCC should require signal booster manufacturers to obtain Part 2 certifications for their devices before they can be sold to consumers.⁸ In order to obtain FCC certification, signal booster manufacturers should be required to submit their devices to an independent lab to verify that they meet all the strict

⁴ See, e.g., Comments of T-Mobile, WT Docket No. 10-4 at 5-6 (filed July 25, 2011) ("T-Mobile Comments"); Comments of CTIA – The Wireless Association, WT Docket 10-4 at 7-10 (filed July 25, 2011) ("CTIA Comments"); Comments of Smart Booster, WT Docket No. 10-4 at 28-29 (filed July 25, 2011) ("Smart Booster Comments"); Comments of the Telecommunications Industry Association, WT Docket No. 10-4 at 2-5 (filed July 25, 2011) ("TIA Comments"); Comments of Verizon Wireless, WT Docket 10-4 at 17-20 (filed July 25, 2011) ("Verizon Comments").

⁵ T-Mobile Comments at 5-6.

⁶ See 47 C.F.R. §1.903(c); 47 C.F.R. §22.3(b).

⁷ See note 4 *supra*.

⁸ See T-Mobile Comments at 6-8; CTIA Comments at 17; TIA Comments at 2-5; Verizon Comments at 8-9, 13.

requirements necessary for proper network operation. The certification process should ensure that the signal booster complies with all the interference protection requirements ultimately adopted in this proceeding. This approach is consistent with the treatment of handsets, and would prevent the deployment of low quality signal boosters that could degrade or disable communications networks, adding substantial costs to mobile network operators that would ultimately be passed on to consumers.

B. Consumers Should Be Required to Register Signal Boosters before Operating the Devices

A registration requirement should be adopted as an essential element of any new signal booster rules.⁹ Consumers should be required to register signal boosters with the host carrier before the device is placed into operation to improve the ability of licensees to identify potential sources of interference, and more quickly locate signal boosters that cause interference. Specifically, signal boosters should be designed so that they cannot operate until they have been registered with the carrier. The registration process need not be burdensome and could mirror the process used for numerous consumer products, such as iPods and other consumer electronic devices. As with those devices, the process could be a simple, online registration that would obtain minimal information from the consumer – the type of device, where it will be used, and contact information for the consumer. Such a process would establish the proper balance of providing licensees with the ability to identify and locate signal boosters that cause interference, with only a *de minimis* burden on consumers.

In addition, the Commission should require consumers to re-register signal boosters if the equipment's location is materially changed and provide guidelines as to what constitutes a material change of location. The re-registration process could be as simple as – or even simpler

⁹ See T-Mobile Comments at 8-9; Verizon Comments at 9.

than – the initial registration procedure. This process to update previously provided information could be conducted online also. This approach would provide consumers the flexibility to bring a purchased signal booster to a new location, but would ensure that carriers have a continued ability to identify potential sources of interference, and locate signal boosters that are interfering with the network.¹⁰

C. A National Clearinghouse Should Be Established to Oversee Signal Booster Deployments

T-Mobile supports the creation of a national clearinghouse to oversee the signal booster process.¹¹ Once a device is registered with the host carrier, the registration information should then be shared with the national clearinghouse. Data gathered by both carriers and the FCC regarding interference from signal boosters also should be shared with the clearinghouse. This interference information received from the FCC and carriers – which should include the model number, location of the device, and method for resolving the interference – would enable the clearinghouse to identify signal boosters models that have a high incidence of interference issues, as well as certain environments that appear especially susceptible to interference.¹²

¹⁰ If the Commission's rules do not require booster operations to be limited to the frequencies of a specific carrier, consumers also should be required to re-register boosters whenever they switch carriers.

¹¹ See T-Mobile Comments at 9-10; Comments of Bird Technologies Group, WT Docket No. 10-4 at 7 (filed July 25, 2011).

¹² As noted in T-Mobile's comments, licensees must have the clear right to prohibit the use of particular models with a history of poor performance. See T-Mobile Comments at 13.

D. Signal Boosters Must Use Interference Prevention Techniques

Signal boosters must be designed to prevent interference to licensed wireless networks.¹³

In particular, signal boosters must at a minimum incorporate the following:

- Technologies that limit operation to carrier-specific frequencies;
- Maximum power limits;
- Limit on the amount of signal delay;
- Automatic gain control;
- Oscillation detection; and
- Uplink mute.

Carrier Specific Operation: “Wideband” signal boosters, signal boosters that amplify a broad range of frequencies, adversely affect the performance of networks unassociated with the consumer’s carriers. Therefore, the Commission should ensure that signal boosters are designed to magnify only the signal of the carrier to whom the purchaser is subscribed.

Maximum Power Limits: The rules should require that all mobile signal boosters be equipped with dynamic power control that would power down the device when full power operations are not necessary, and T-Mobile supports the Commission’s proposal to require consumers with fixed signal boosters to coordinate power levels with the licensee. The Commission should also establish a maximum power output for all signal boosters that could be set by carriers or established after study by the Technological Advisory Council or a similar group.

Signal Delay Limits: The Commission should impose a maximum delay limit that would lower the risk of an access failure due to signal booster induced delay.

¹³ See T-Mobile Comments at 10-12; Comments of Cell Antenna Corporation, WT Docket No. 10-4 at 2 (filed July 25, 2011); Comments of CommScope, WT Docket No. 10-4 at 2-3 (filed July 25, 2011); CTIA Comments at 14-16.

Automatic Gain Control: The Commission should require all signal boosters to incorporate automatic gain control. Because networks are generally designed around dynamic power control, devices without automatic gain control can cause significant network problems.

Oscillation Detection: Signal boosters must be designed to self-monitor their operations and shut down if they cause oscillation or otherwise operate outside of technical parameters applied to the devices.

Uplink Mute: The signal booster should have capability of muting uplink during the periods of no user traffic to reduce chances of interference to the wireless network.

E. Signal Boosters Must Be Designed to Permit CMRS Licensees to Shut Down or Modify Their Operations Remotely

As discussed in T-Mobile's initial comments, signal boosters must be designed to self-monitor operations and to automatically shut down if they begin to malfunction or violate the technical rules established by the Commission.¹⁴ In addition to automatic shutdown, CMRS licensees should have capability to shut down or modify signal booster operation at will. Such a requirement will ensure that interference issues can be rapidly addressed where they arise. The Commission should allow industry groups to evaluate the best approaches for implementing this remote shut down capability.

F. The Commission Must Consider the Impact of Signal Boosters on E911 Capabilities

Signal boosters directly impact network reliability and, as the record in this proceeding demonstrates, may impact E911 capabilities. In some cases, boosters may improve coverage and the ability to place 911 calls, while in other situations, boosters may interfere with the network or

¹⁴ See T-Mobile Comments at 12-13; *accord* Comments of Cellular Specialties, WT Docket No. 10-4 at 2 (filed July 25, 2011); CTIA Comments at 16-17.

cause performance issues for the network and E911 solutions.¹⁵ Various public safety entities noted in the network reliability docket that actions involving network reliability cannot be undertaken in a vacuum and must include an evaluation of potential impacts on E911 capabilities.¹⁶ T-Mobile agrees. As part of this evaluation, the Commission should address E911 liability issues arising from the use of boosters.¹⁷

II. WITH MODIFICATIONS, THE JOINT PROPOSAL ESTABLISHES A WORKABLE FRAMEWORK FOR SIGNAL BOOSTER RULES

T-Mobile commends the work undertaken to craft the Joint Proposal and agrees with the three general signal booster categories proposed.¹⁸ The Joint Proposal also contains many of the essential criteria identified in T-Mobile's initial comments, such as certification and registration.¹⁹ T-Mobile wishes to stress, however, that registration must occur *before* boosters can commence operation. In addition, T-Mobile believes the proposed framework can best be refined to protect all carrier networks, but still allow the development of innovative signal boosters, through a stakeholder-based approach wherein interested parties would work through a standards organization or other recognized body.

¹⁵ See, e.g., T-Mobile Comments at 10; CTIA Comments at 3-5; Smart Booster Comments at 31-32; TIA Comments at 6-7.

¹⁶ See Joint Initial Comments of the Texas Commission on State Emergency Communications and the Texas 9-1-1 Alliance, PS Docket No. 11-60 at 2 (filed July 7, 2011) (“[I]t is imperative that [network reliability] issues be addressed in the context of legacy 9-1-1 networks, transition/migration 9-1-1 IP networks, and NG911 networks”); Reply Comments of the National Emergency Number Association, PS Docket No. 11-60 at 1-4 (filed Aug. 15, 2011).

¹⁷ T-Mobile Comments at 10; TIA Comments at 6-7.

¹⁸ See Joint Proposal at 1.

¹⁹ See *id.* at 2; T-Mobile Comments at 6-9.

T-Mobile supports the booster type categorizations in the Joint Proposal: Licensee Installed Boosters; Certified Engineered and Operated (“CEO”) Boosters; and Consumer Boosters. As defined by the Joint Proposal, Carrier Installed Boosters are “boosters installed by FCC licensees to operate exclusively on the licensee’s frequencies”; Certified Engineered and Operated Boosters are “larger, higher powered signal boosters designed for large offices, campuses, and similar settings that require professional installation and close carrier coordination”; and Consumer Boosters are “small fixed and mobile signal boosters that can [be] purchased, installed and used by consumers.”²⁰

Licensee Installed Boosters: Since Licensee Installed Boosters are installed by or with the consent of the licensee itself, T-Mobile agrees that they should not be subjected to the rules imposed on CEO Boosters and Consumer Boosters.²¹ Even though Licensee Installed Boosters will not have to abide by the Consumer Booster performance specifications, Licensee Installed Boosters should be considered part of the licensee’s network equipment and, accordingly, should cause no interference to other networks.

CEO Boosters: Because they are installed by licensed professionals and coordinated with carriers, T-Mobile agrees that CEO Boosters should not be subject to the stricter standards associated with Consumer Boosters.²² Additionally, T-Mobile supports the idea of an industry effort to develop standards for CEO Boosters.²³

²⁰ Joint Proposal at 1.

²¹ *See id.* at 3.

²² *See id.* at 2-3.

²³ *See id.* at 2.

Consumer Boosters: T-Mobile supports the development of standards for Consumer Boosters, but notes that any such standards must be consistent with the requisite protections discussed above (*e.g.*, registration, certification, interference protection).

The signal booster rules, however, must not favor a particular design or manufacturer. The rules should be technology neutral and intended to promote the design and deployment of various, robust, well-designed signal boosters. As the Commission has found in the past, such an approach will promote competition, drive down costs, and encourage innovation.²⁴ In this regard, the Joint Proposal appears to favor a single type of Consumer Booster – one that uses bi-directional RF amplifier hardware with externally mounted antennas.²⁵ T-Mobile believes that such an approach may be too restrictive. Other designs may be more conducive to or preferred for a particular environment, *e.g.*, an indoor booster with internal antenna may be preferable for in-home use. The Commission should not create rules that inhibit competition and innovation by favoring a particular type of Consumer Booster. As discussed further below, a stakeholder approach would enable the development of innovative signal booster designs that do not interfere with carrier networks.

In addition, while standards pertaining to antenna types, connector types, power levels, and overload gain limits are necessary, those set forth in the Joint Proposal may not be

²⁴ See, *e.g.*, *Modification of Parts 2 and 15 of the Commission's Rules for Unlicensed Devices and Equipment Approval*, 19 FCC Rcd 13539, 13543 (2004) (“The rules we adopt herein are technologically neutral and will permit operations of various new and developing antenna technologies.”); *Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, 19 FCC Rcd 13356, 13377 (2004) (“This spectrum sharing plan represents a more technology neutral approach to assigning spectrum.... Consequently, this sharing should promote more market-driven, as opposed to regulatory-driven, uses of spectrum. As discussed in prior Commission decisions, we consider technical neutrality to be an important spectrum management objective.”).

²⁵ See Joint Proposal at 2 (“Consumer Boosters must be bi-directional RF amplifiers.”).

appropriate for all carrier networks or booster types. For example, the Joint Proposal sets forth power limits of 1 Watt uplink composite power per band of operation and 0.05 Watt downlink composite power per band of operation.²⁶ These power limits are not clearly specified when it comes to the bandwidth and time interval to which they apply and they may preclude consumers on certain networks from enjoying the benefits of a booster in more remote locations. Signal booster requirements must ensure that consumers of all carriers can receive the benefits that these devices can provide – such requirements can best be developed through a multi-stakeholder approach.

Although the Joint Proposal represents an adequate foundation for signal booster rules, a variety of other consumer signal booster designs may be possible that could adequately protect incumbent operators from interference but would be prohibited under the specific preferences offered in the Joint Proposal. As discussed above, a stakeholder approach to developing standards for consumer signal boosters should be established similar to the concept for CEO boosters set forth in the Joint Proposal.²⁷ A stakeholder approach of interested parties and industry experts working together to develop technical requirements that protect carrier networks has support in the record.²⁸ Under such an approach, the industry could work with a respected standards group to develop technologically neutral booster specifications that meet the goal of increasing coverage areas while minimizing potentially harmful effects to carrier networks. This approach also fosters technological neutrality, thus promoting competition and encouraging innovation, and would facilitate the development and deployment of Consumer Boosters that

²⁶ *See id.*

²⁷ *See* Joint Proposal at 2.

²⁸ *See* Comments of CelLynx, WT Docket 10-4 at 4 (filed July 25, 2011); Verizon Comments at 13.

protect incumbent, exclusive licensees from interference while at the same time providing the benefits of increased network coverage to consumers.

CONCLUSION

T-Mobile supports the efforts of the Commission to facilitate the deployment and use of third-party signal boosters, as well as the efforts of Verizon Wireless, V-COMM, and Wilson Electronics to establish a collaborative framework for signal booster rules. The Commission should construct its rules in part based on the commendable work these companies have done, but add modifications to ensure consumer choice, encourage innovation, promote competition, and protect incumbent licensees. T-Mobile believes that a stakeholder approach will best achieve these goals.

Respectfully submitted,

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